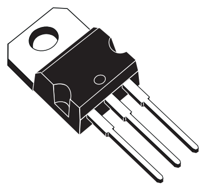
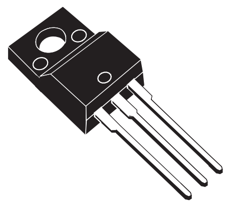
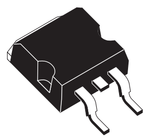
# L7900
# SERIES

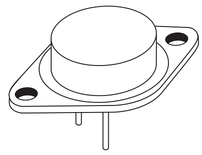
## NEGATIVE VOLTAGE REGULATORS

- OUTPUT CURRENT UP TO 1.5A
- OUTPUT VOLTAGES OF -5; -5.2; -6; -8; -9; -12; -15; -18; -20; -22; -24V
- THERMAL OVERLOAD PROTECTION
- SHORT CIRCUIT PROTECTION
- OUTPUT TRANSITION SOA PROTECTION


TO-220


TO-220FP


$D^2PAK$

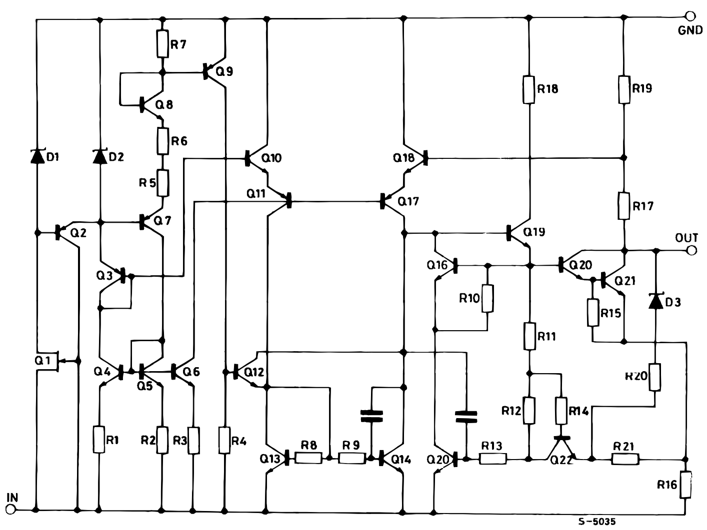

TO-3

### DESCRIPTION

The L7900 series of three-terminal negative regulators is available in TO-220, TO-220FP, TO-3 and $D^2PAK$ packages and several fixed output voltages, making it useful in a wide range of applications. These regulators can provide local on-card regulation, eliminating the distribution problems associated with single point regulation; furthermore, having the same voltage option as the L7800 positive standard series, they are particularly suited for split power supplies. In addition, the -5.2V is also available for ECL system. If adequate heat sinking is provided, they can deliver over 1.5A output current.

Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

### SCHEMATIC DIAGRAM



## ABSOLUTE MAXIMUM RATINGS

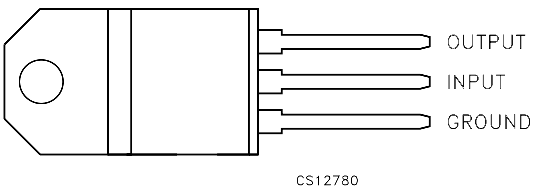
| Symbol | Parameter[2] | | Value | Unit |
|---|---|---|---|---|
| $V_I$ | DC Input Voltage | for $V_O$ = 5 to 18V | -35 | V |
| | | for $V_O$ = 20, 24V | -40 | |
| $I_O$ | Output Current | | Internally Limited | |
| $P_{tot}$ | Power Dissipation | | Internally Limited | |
| $T_{stg}$ | Storage Temperature Range | | -65 to 150 | °C |
| $T_{op}$ | Operating Junction Temperature Range | | 0 to 150 | °C |

Absolute Maximum Ratings are those values beyond which damage to the device may occur. Functional operation under these condition is not implied.

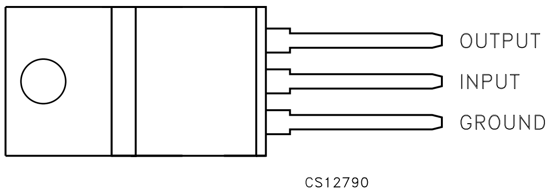
## THERMAL DATA

| Symbol | Parameter | | D²PAK | TO-220 | TO-220FP | TO-3 | Unit |
|---|---|---|---|---|---|---|---|
| $R_{thj\text{-}case}$ | Thermal Resistance Junction-case | Max | 3 | 3 | 5 | 4 | °C/W |
| $R_{thj\text{-}amb}$ | Thermal Resistance Junction-ambient | Max | 62.5 | 50 | 60 | 35 | °C/W |

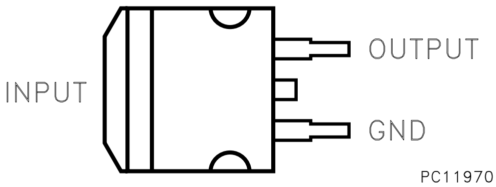
## CONNECTION DIAGRAM (top view)



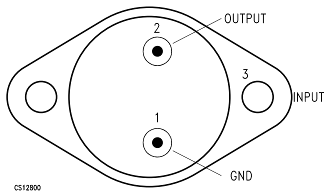

TO-220




TO-220FP




D²PAK



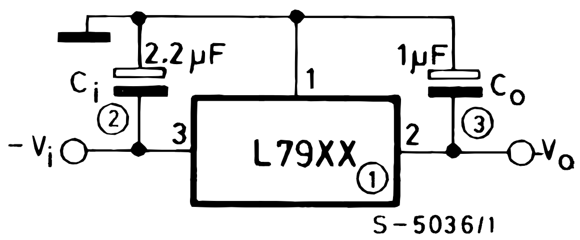

TO-3

## ORDERING CODES

| TYPE | TO-220 | $D^2$PAK (*) | TO-220FP | TO-3 | OUTPUT VOLTAGE |
|---|---|---|---|---|---|
| L7905C | L7905CV | L7905ACD2T | L7905CP | L7905CT | -5 V |
| L7952C | L7952CV | L7952ACD2T | | L7952CT | -5.2 V |
| L7906C | L7906CV | L7906ACD2T | L7906CP | L7906CT | -6 V |
| L7908C | L7908CV | L7908ACD2T | L7908CP | L7908CT | -8 V |
| L7912C | L7912CV | L7912ACD2T | L7912CP | L7912CT | -12 V |
| L7915C | L7915CV | L7915ACD2T | L7915CP | L7915CT | -15 V |
| L7918C | L7918CV | L7918ACD2T | L7918CP | L7918CT | -18 V |
| L7920C | L7920CV | L7920ACD2T | L7920CP | L7920CT | -20 V |
| L7922C | L7922CV | L7922ACD2T | | L7922CT | -22 V |
| L7924C | L7924CV | L7924ACD2T | L7924CP | L7924CT | -24 V |

(*) Available in Tape & Reel with the suffix "-TR".

## TEST CIRCUIT




**ELECTRICAL CHARACTERISTICS OF L7905C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -10V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -4.8 | -5 | -5.2 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A  $P_O \leq$ 15 W<br>$V_I$ = 8 to 20 V | -4.75 | -5 | -5.25 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -7 to -25 V  $T_J$ = 25°C | | | 100 | mV |
| | | $V_I$ = -8 to -12 V  $T_J$ = 25°C | | | 50 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A  $T_J$ = 25°C | | | 100 | mV |
| | | $I_O$ = 250 to 750 mA  $T_J$ = 25°C | | | 50 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -8 to -25 V | | | 1.3 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -0.4 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz  $T_J$ = 25°C | | 100 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V  f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A  $T_J$ = 25°C  $\Delta V_O$ = 100 mV | | 1.4 | | V |
| $I_{sc}$ | Short Circuit Current | | | 2.1 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**ELECTRICAL CHARACTERISTICS OF L7952C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -10V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -5.0 | -5.2 | -5.4 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A $P_O$ ≤ 15 W<br>$V_I$ = -9 to -21 V | -4.95 | -5.2 | -5.45 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -8 to -25 V $T_J$ = 25°C | | | 105 | mV |
| | | $V_I$ = -9 to -12 V $T_J$ = 25°C | | | 52 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 105 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 52 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -9 to -25 V | | | 1.3 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -0.5 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J$ = 25°C | | 125 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C $\Delta V_O$ = 100 mV | | 1.4 | | V |
| $I_{sc}$ | Short Circuit Current | | | 2 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**ELECTRICAL CHARACTERISTICS OF L7906C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -11V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -5.75 | -6 | -6.25 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A $P_O$ ≤ 15 W<br>$V_I$ = -9.5 to -21.5 V | -5.7 | -6 | -6.3 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -8.5 to -25 V $T_J$ = 25°C | | | 120 | mV |
| | | $V_I$ = -9 to -15 V $T_J$ = 25°C | | | 60 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 120 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 60 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -9.5 to -25 V | | | 1.3 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -0.6 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J$ = 25°C | | 144 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C $\Delta V_O$ = 100 mV | | 1.4 | | V |
| $I_{sc}$ | Short Circuit Current | | | 2 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**ELECTRICAL CHARACTERISTICS OF L7908C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -14V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -7.7 | -8 | -8.3 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A $P_O \leq$ 15 W<br>$V_I$ = -11.5 to -23 V | -7.6 | -8 | -8.4 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -10.5 to -25 V $T_J$ = 25°C | | | 160 | mV |
| | | $V_I$ = -11 to -17 V $T_J$ = 25°C | | | 80 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 160 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 80 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -11.5 to -25 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -0.6 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J$ = 25°C | | 175 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C $\Delta V_O$ = 100 mV | | 1.1 | | V |
| $I_{sc}$ | Short Circuit Current | | | 1.5 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**ELECTRICAL CHARACTERISTICS OF L7912C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -19V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -11.5 | -12 | -12.5 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A $P_O \leq$ 15 W<br>$V_I$ = -15.5 to -27 V | -11.4 | -12 | -12.6 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -14.5 to -30 V $T_J$ = 25°C | | | 240 | mV |
| | | $V_I$ = -16 to -22 V $T_J$ = 25°C | | | 120 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 240 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 120 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -15 to -30 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -0.8 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J$ = 25°C | | 200 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C $\Delta V_O$ = 100 mV | | 1.1 | | V |
| $I_{sc}$ | Short Circuit Current | | | 1.5 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**ELECTRICAL CHARACTERISTICS OF L7915C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -23V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -14.4 | -15 | -15.6 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A $P_O \leq$ 15 W<br>$V_I$ = -18.5 to -30 V | -14.3 | -15 | -15.7 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -17.5 to -30 V $T_J$ = 25°C | | | 300 | mV |
| | | $V_I$ = -20 to -26 V $T_J$ = 25°C | | | 150 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 300 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 150 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -18.5 to -30 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -0.9 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J$ = 25°C | | 250 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C $\Delta V_O$ = 100 mV | | 1.1 | | V |
| $I_{sc}$ | Short Circuit Current | | | 1.3 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**ELECTRICAL CHARACTERISTICS OF L7918C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -27V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -17.3 | -18 | -18.7 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A $P_O \leq$ 15 W<br>$V_I$ = -22 to -33 V | -17.1 | -18 | -18.9 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -21 to -33 V $T_J$ = 25°C | | | 360 | mV |
| | | $V_I$ = -24 to -30 V $T_J$ = 25°C | | | 180 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 360 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 180 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -22 to -33 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -1 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J$ = 25°C | | 300 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C $\Delta V_O$ = 100 mV | | 1.1 | | V |
| $I_{sc}$ | Short Circuit Current | | | 1.1 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**ELECTRICAL CHARACTERISTICS OF L7920C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -29V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -19.2 | -20 | -20.8 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A $P_O \leq$ 15 W<br>$V_I$ = -24 to -35 V | -19 | -20 | -21 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -23 to -35 V $T_J$ = 25°C | | | 400 | mV |
| | | $V_I$ = -26 to -32 V $T_J$ = 25°C | | | 200 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 400 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 200 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -24 to -35 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -1.1 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J$ = 25°C | | 350 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C $\Delta V_O$ = 100 mV | | 1.1 | | V |
| $I_{sc}$ | Short Circuit Current | | | 0.9 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

**ELECTRICAL CHARACTERISTICS OF L7922C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -31V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -21.1 | -22 | -22.9 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A $P_O \leq$ 15 W<br>$V_I$ = -26 to -37 V | -20.9 | -22 | -23.1 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -25 to -37 V $T_J$ = 25°C | | | 440 | mV |
| | | $V_I$ = -28 to -34 V $T_J$ = 25°C | | | 220 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A $T_J$ = 25°C | | | 440 | mV |
| | | $I_O$ = 250 to 750 mA $T_J$ = 25°C | | | 220 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -26 to -37 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -1.1 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz $T_J$ = 25°C | | 375 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A $T_J$ = 25°C $\Delta V_O$ = 100 mV | | 1.1 | | V |
| $I_{sc}$ | Short Circuit Current | | | 1.1 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

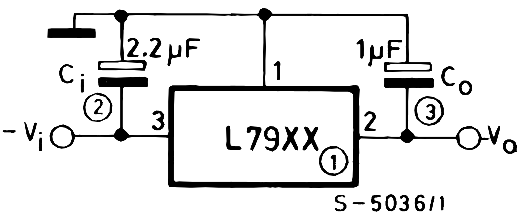
**ELECTRICAL CHARACTERISTICS OF L7924C** (refer to the test circuits, $T_J$ = 0 to 125°C, $V_I$ = -33V, $I_O$ = 500 mA, $C_I$ = 2.2 µF, $C_O$ = 1 µF unless otherwise specified).

| Symbol | Parameter | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_O$ | Output Voltage | $T_J$ = 25°C | -23 | -24 | -24.5 | V |
| $V_O$ | Output Voltage | $I_O$ = -5 mA to -1 A  $P_O \leq$ 15 W<br>$V_I$ = -27 to -38 V | -22.8 | -24 | -25.2 | V |
| $\Delta V_O$(*) | Line Regulation | $V_I$ = -27 to -38 V  $T_J$ = 25°C | | | 480 | mV |
| | | $V_I$ = -30 to -36 V  $T_J$ = 25°C | | | 240 | |
| $\Delta V_O$(*) | Load Regulation | $I_O$ = 5 mA to 1.5 A  $T_J$ = 25°C | | | 480 | mV |
| | | $I_O$ = 250 to 750 mA  $T_J$ = 25°C | | | 240 | |
| $I_d$ | Quiescent Current | $T_J$ = 25°C | | | 3 | mA |
| $\Delta I_d$ | Quiescent Current Change | $I_O$ = 5 mA to 1 A | | | 0.5 | mA |
| | | $V_I$ = -27 to -38 V | | | 1 | |
| $\Delta V_O/\Delta T$ | Output Voltage Drift | $I_O$ = 5 mA | | -1 | | mV/°C |
| eN | Output Noise Voltage | B = 10Hz to 100KHz  $T_J$ = 25°C | | 400 | | µV |
| SVR | Supply Voltage Rejection | $\Delta V_I$ = 10 V  f = 120Hz | 54 | 60 | | dB |
| $V_d$ | Dropout Voltage | $I_O$ = 1 A  $T_J$ = 25°C  $\Delta V_O$ = 100 mV | | 1.1 | | V |
| $I_{sc}$ | Short Circuit Current | | | 1.1 | | A |

(*) Load and line regulation are specified at constant junction temperature. Changes in $V_O$ due to heating effects must be taken into account separately. Pulse testing with low duty cycle is used.

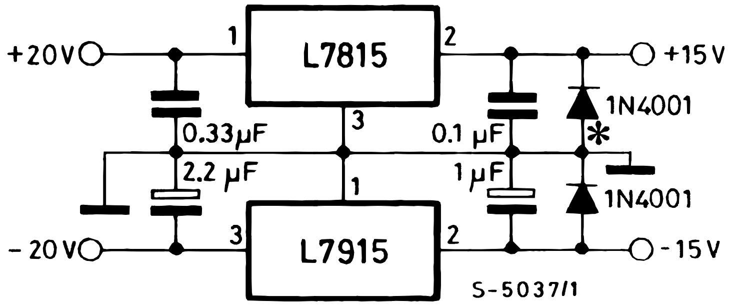
## APPLICATIONS INFORMATION

**Figure 1 :** Fixed Output Regulator



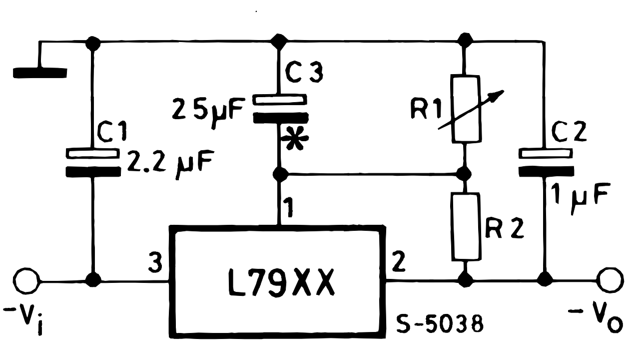

NOTE:
1. To specify an output voltage, substitute voltage value for "XX".
2. Required for stability. For value given, capacitor must be solid tantalum. If aluminium electrolytics are used, at least ten times value should be selected. C1 is required if regulator is located an appreciable distance from power supply filter.
3. To improve transient response. If large capacitors are used, a high current diode from input to output (1N4001 or similar) should be introduced to protect the device from momentary input short circuit.

**Figure 2 :** Split Power Supply (± 15V/1A)




Against potential latch-up problems.

**Figure 3 :** Circuit for Increasing Output Voltage




$$V_O = V_{xx}\frac{R_1 + R_2}{R_2} \qquad \frac{V_{xx}}{R_2} > 3I_d$$

C3 Optional for improved transient response and ripple rejection.

**Figure 4 :** High Current Negative Regulator (-5V/4A with 5A current limiting)

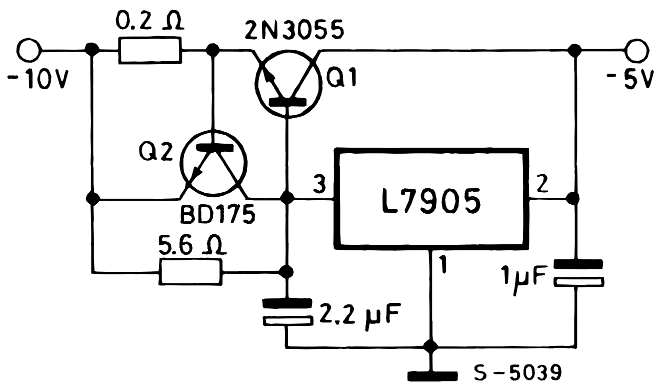
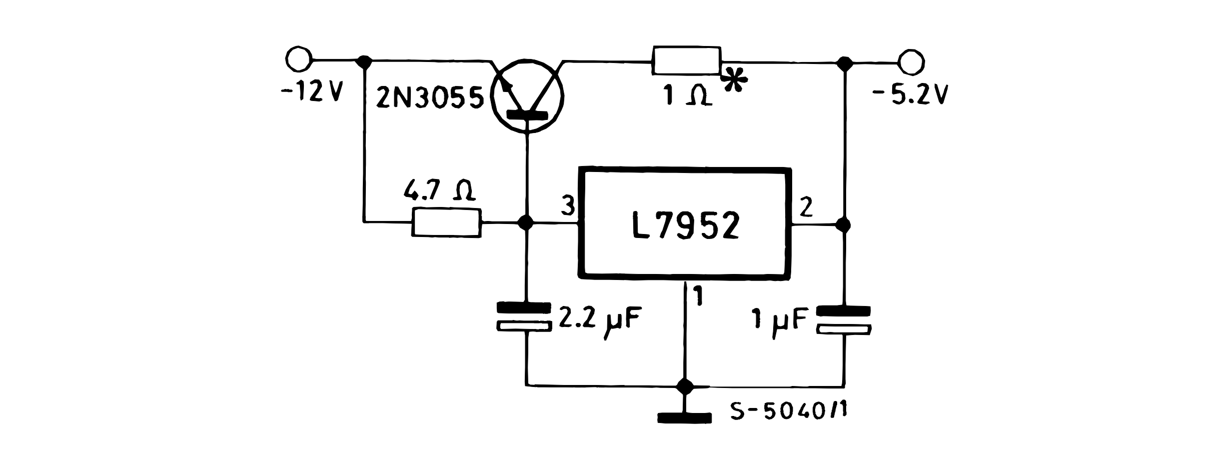


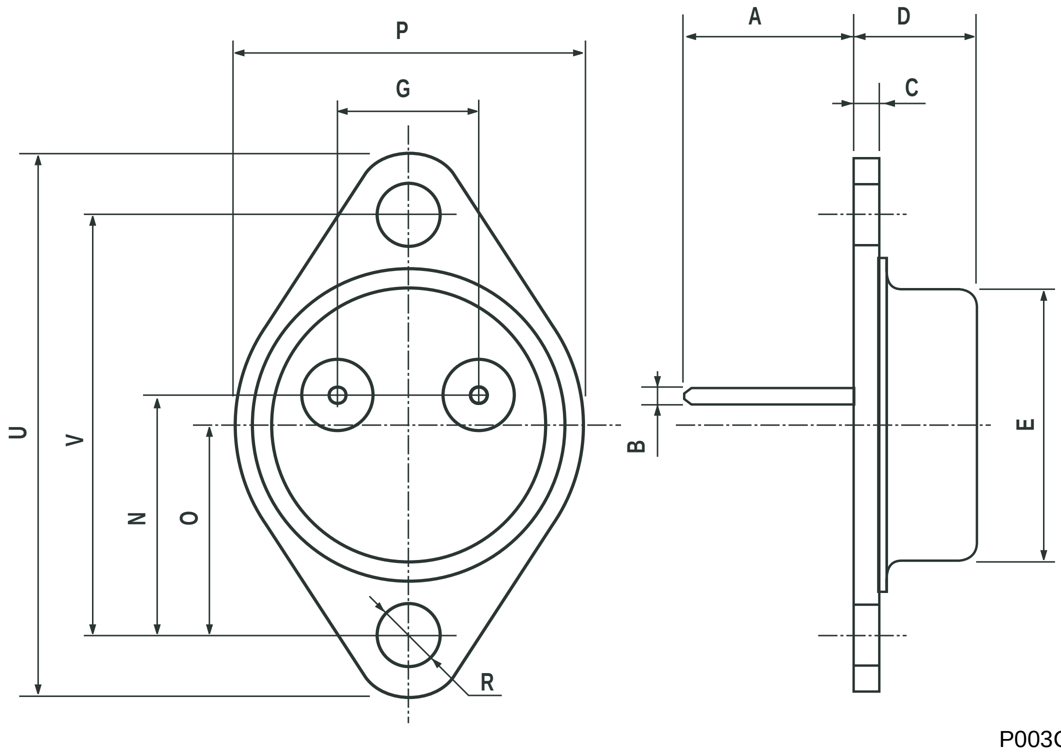
**Figure 5 :** Typical ECL System Power Supply (-5.2V/4A)




Optional dropping resistor to reduce the power dissipated in the boost transistor.

## TO-3 MECHANICAL DATA

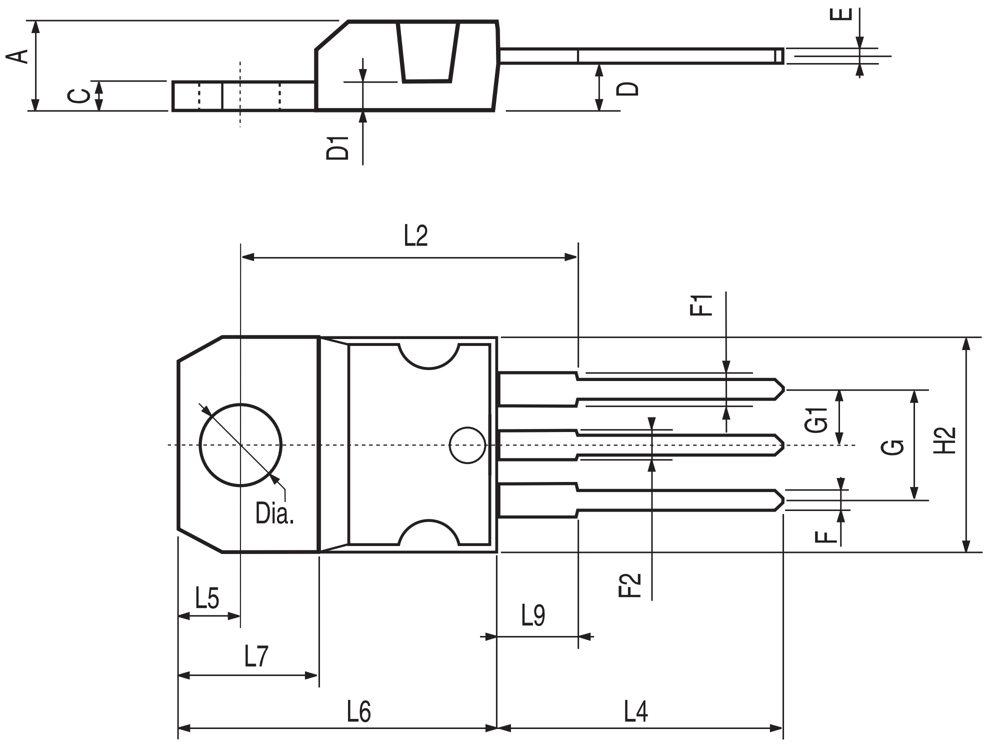
| DIM. | mm. | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | 11.85 | | | 0.466 | |
| B | 0.96 | 1.05 | 1.10 | 0.037 | 0.041 | 0.043 |
| C | | | 1.70 | | | 0.066 |
| D | | | 8.7 | | | 0.342 |
| E | | | 20.0 | | | 0.787 |
| G | | 10.9 | | | 0.429 | |
| N | | 16.9 | | | 0.665 | |
| P | | | 26.2 | | | 1.031 |
| R | 3.88 | | 4.09 | 0.152 | | 0.161 |
| U | | | 39.5 | | | 1.555 |
| V | | 30.10 | | | 1.185 | |




P003C/C

## TO-220 MECHANICAL DATA

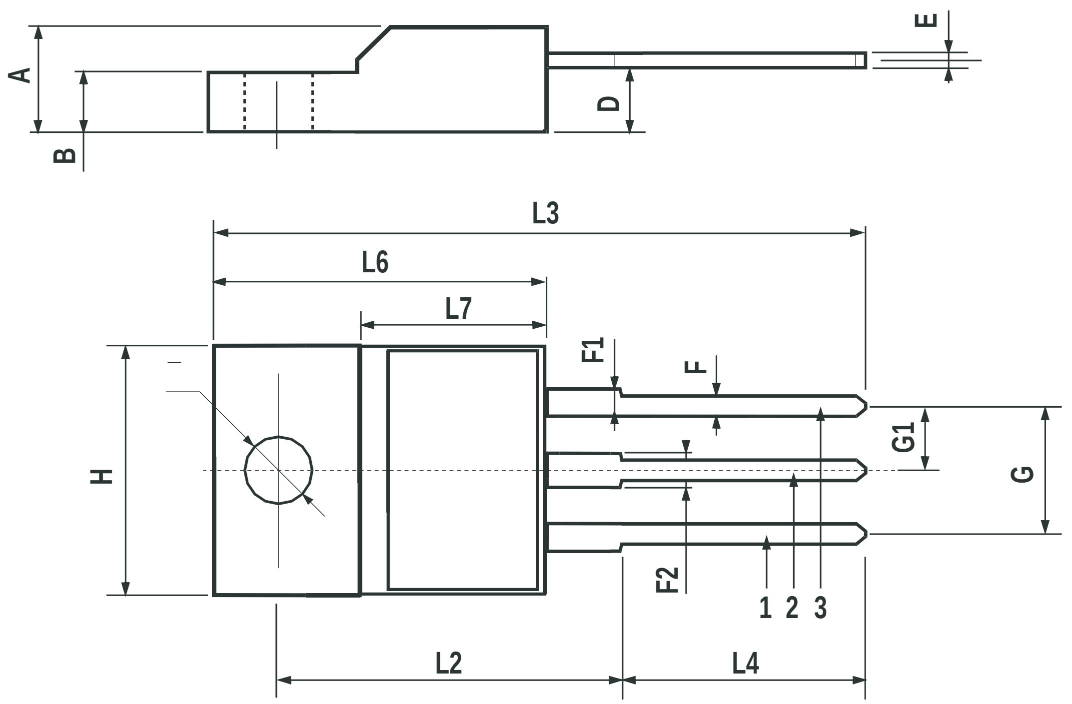
| DIM. | mm. | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| C | 1.23 | | 1.32 | 0.048 | | 0.051 |
| D | 2.40 | | 2.72 | 0.094 | | 0.107 |
| D1 | | 1.27 | | | 0.050 | |
| E | 0.49 | | 0.70 | 0.019 | | 0.027 |
| F | 0.61 | | 0.88 | 0.024 | | 0.034 |
| F1 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| F2 | 1.14 | | 1.70 | 0.044 | | 0.067 |
| G | 4.95 | | 5.15 | 0.194 | | 0.203 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H2 | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16.4 | | | 0.645 | |
| L4 | 13.0 | | 14.0 | 0.511 | | 0.551 |
| L5 | 2.65 | | 2.95 | 0.104 | | 0.116 |
| L6 | 15.25 | | 15.75 | 0.600 | | 0.620 |
| L7 | 6.2 | | 6.6 | 0.244 | | 0.260 |
| L9 | 3.5 | | 3.93 | 0.137 | | 0.154 |
| DIA. | 3.75 | | 3.85 | 0.147 | | 0.151 |




P011C

## TO-220FP MECHANICAL DATA

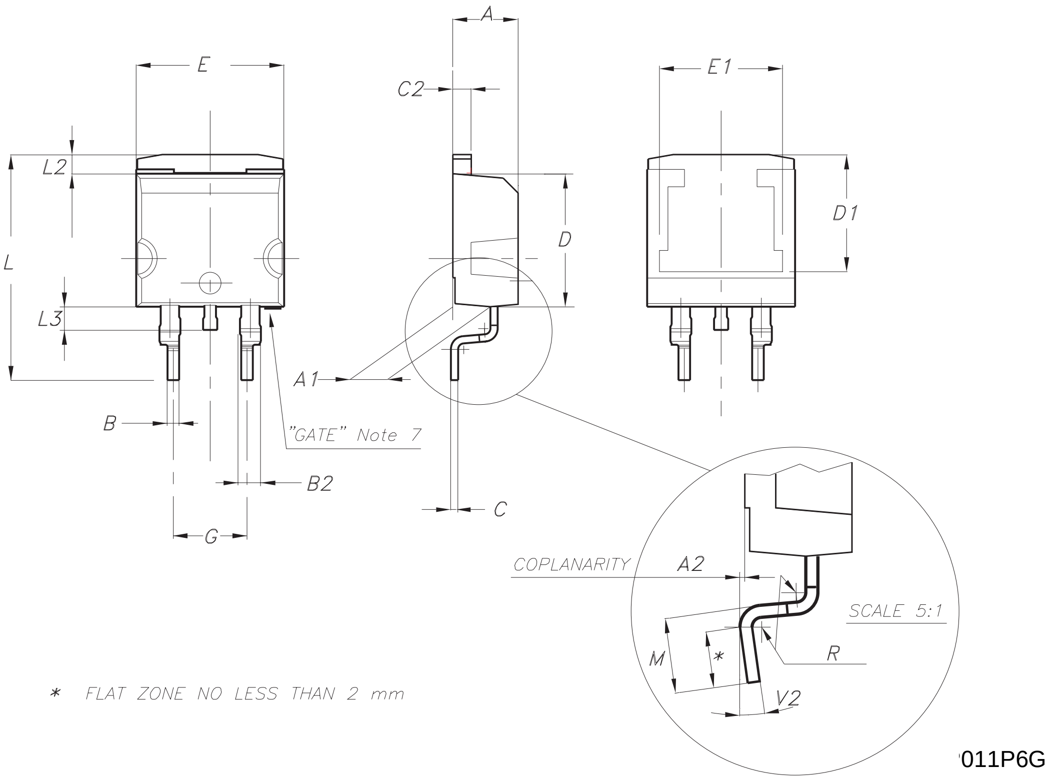
| DIM. | mm. | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.40 | | 4.60 | 0.173 | | 0.181 |
| B | 2.5 | | 2.7 | 0.098 | | 0.106 |
| D | 2.5 | | 2.75 | 0.098 | | 0.108 |
| E | 0.45 | | 0.70 | 0.017 | | 0.027 |
| F | 0.75 | | 1 | 0.030 | | 0.039 |
| F1 | 1.15 | | 1.50 | 0.045 | | 0.059 |
| F2 | 1.15 | | 1.50 | 0.045 | | 0.059 |
| G | 4.95 | | 5.2 | 0.194 | | 0.204 |
| G1 | 2.4 | | 2.7 | 0.094 | | 0.106 |
| H | 10.0 | | 10.40 | 0.393 | | 0.409 |
| L2 | | 16 | | | 0.630 | |
| L3 | 28.6 | | 30.6 | 1.126 | | 1.204 |
| L4 | 9.8 | | 10.6 | 0.385 | | 0.417 |
| L6 | 15.9 | | 16.4 | 0.626 | | 0.645 |
| L7 | 9 | | 9.3 | 0.354 | | 0.366 |
| DIA. | 3 | | 3.2 | 0.118 | | 0.126 |




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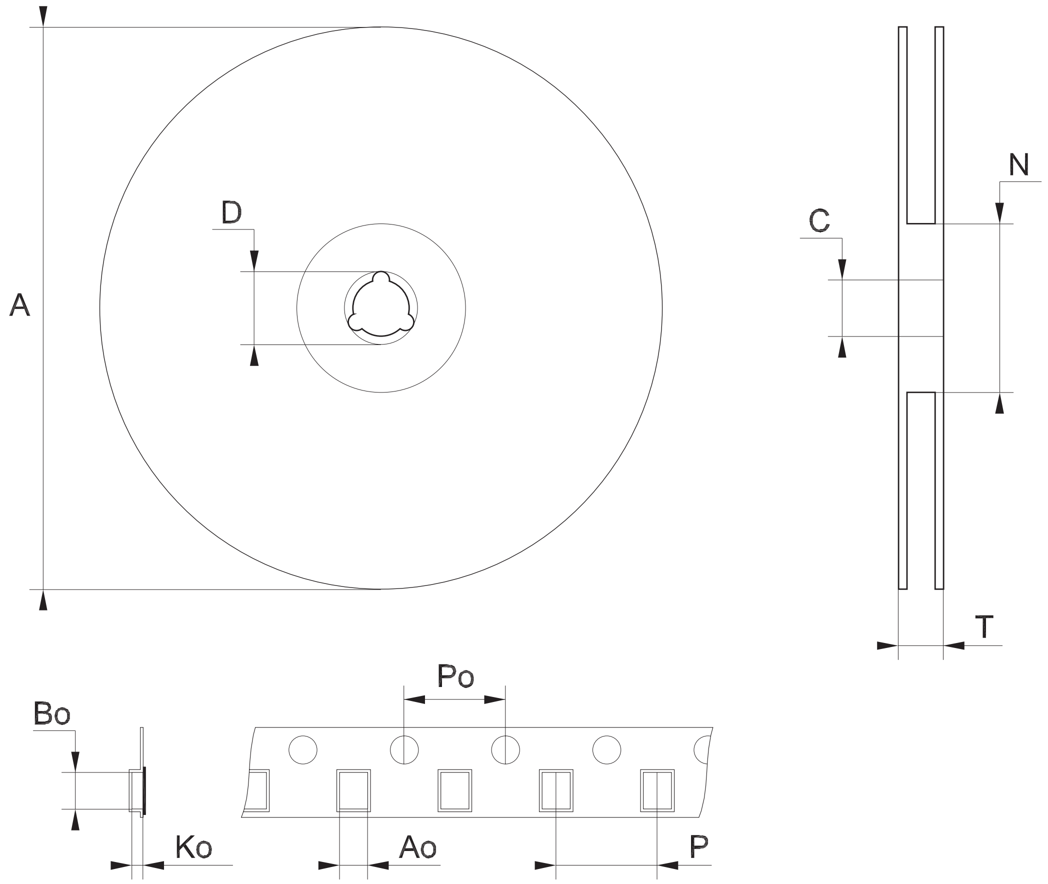
# D²PAK MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | 4.4 | | 4.6 | 0.173 | | 0.181 |
| A1 | 2.49 | | 2.69 | 0.098 | | 0.106 |
| A2 | 0.03 | | 0.23 | 0.001 | | 0.009 |
| B | 0.7 | | 0.93 | 0.027 | | 0.036 |
| B2 | 1.14 | | 1.7 | 0.044 | | 0.067 |
| C | 0.45 | | 0.6 | 0.017 | | 0.023 |
| C2 | 1.23 | | 1.36 | 0.048 | | 0.053 |
| D | 8.95 | | 9.35 | 0.352 | | 0.368 |
| D1 | | 8 | | | 0.315 | |
| E | 10 | | 10.4 | 0.393 | | 0.409 |
| E1 | | 8.5 | | | 0.335 | |
| G | 4.88 | | 5.28 | 0.192 | | 0.208 |
| L | 15 | | 15.85 | 0.590 | | 0.624 |
| L2 | 1.27 | | 1.4 | 0.050 | | 0.055 |
| L3 | 1.4 | | 1.75 | 0.055 | | 0.068 |
| M | 2.4 | | 3.2 | 0.094 | | 0.126 |
| R | | 0.4 | | | 0.016 | |
| V2 | 0° | | 8° | 0° | | 8° |



## Tape & Reel D$^2$PAK-P$^2$PAK-D$^2$PAK/A-P$^2$PAK/A MECHANICAL DATA

| DIM. | mm. | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP | MAX. | MIN. | TYP. | MAX. |
| A | | | 180 | | | 7.086 |
| C | 12.8 | 13.0 | 13.2 | 0.504 | 0.512 | 0.519 |
| D | 20.2 | | | 0.795 | | |
| N | 60 | | | 2.362 | | |
| T | | | 14.4 | | | 0.567 |
| Ao | 10.50 | 10.6 | 10.70 | 0.413 | 0.417 | 0.421 |
| Bo | 15.70 | 15.80 | 15.90 | 0.618 | 0.622 | 0.626 |
| Ko | 4.80 | 4.90 | 5.00 | 0.189 | 0.193 | 0.197 |
| Po | 3.9 | 4.0 | 4.1 | 0.153 | 0.157 | 0.161 |
| P | 11.9 | 12.0 | 12.1 | 0.468 | 0.472 | 0.476 |




Note: Drawing not in scale

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